



Applicant's or agent's file reference XA1654	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/GB 03/02552	International filing date (day/month/year) 13.06.2003	Priority date (day/month/year) 18.06.2002
International Patent Classification (IPC) or both national classification and IPC H01Q3/26		
Applicant BAE SYSTEMS PLC et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 7 sheets, including this cover sheet.
- ☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).
- These annexes consist of a total of 3 sheets.

3. This report contains indications relating to the following items:
- I ☒ Basis of the opinion
 - II ☐ Priority
 - III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
 - IV ☒ Lack of unity of invention
 - V ☒ Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
 - VI ☐ Certain documents cited
 - VII ☐ Certain defects in the international application
 - VIII ☐ Certain observations on the international application

Date of submission of the demand 18.12.2003	Date of completion of this report 16.09.2004
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**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/GB 03/02552

I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

Description, Pages

1-16 as originally filed

Claims, Numbers

1-22 received on 02.09.2004 with letter of 02.09.2004

Drawings, Sheets

1-4 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
 - ☐ the language of publication of the international application (under Rule 48.3(b)).
 - ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).
3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:
- ☐ contained in the international application in written form.
 - ☐ filed together with the international application in computer readable form.
 - ☐ furnished subsequently to this Authority in written form.
 - ☐ furnished subsequently to this Authority in computer readable form.
 - ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
 - ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.
4. The amendments have resulted in the cancellation of:
- ☐ the description, pages:
 - ☐ the claims, Nos.:
 - ☐ the drawings, sheets:

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5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

IV. Lack of unity of invention

1. In response to the invitation to restrict or pay additional fees, the applicant has:

- ☐ restricted the claims.
☒ paid additional fees.
☐ paid additional fees under protest.
☐ neither restricted nor paid additional fees.

2. ☐ This Authority found that the requirement of unity of invention is not complied with and chose, according to Rule 68.1, not to invite the applicant to restrict or pay additional fees.

3. This Authority considers that the requirement of unity of invention in accordance with Rules 13.1, 13.2 and 13.3 is

- ☐ complied with.
☒ not complied with for the following reasons:

see separate sheet

4. Consequently, the following parts of the international application were the subject of international preliminary examination in establishing this report:

- ☐ all parts.
☒ the parts relating to claims Nos. 1-9 .

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	
	No: Claims	1-9
Inventive step (IS)	Yes: Claims	
	No: Claims	1-9
Industrial applicability (IA)	Yes: Claims	1-9
	No: Claims	

2. Citations and explanations

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see separate sheet

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EXAMINATION REPORT - SEPARATE SHEET**

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Reference is made to the following documents:

- D11: XP000830201; "MULTIFUNCTION WIDE-BAND ARRAY DESIGN"; IEEE TRANSACTIONS ON ANTENNAS AND PROPAGATION, IEEE INC. NEW YORK, US; HEMMI C
- D12: XP010504536; "Overview of advanced multifunction RF system (AMRFS)"; Phased Array Systems and Technology, 2000. Proceedings. 2000 IEEE International Conference on Dana Point, CA, USA 21-25 May 2000, Piscataway, NJ, USA, IEEE, US; Hughes P K, Choe J Y

The documents D11, D12 were cited by the applicant.

Re Item IV

Lack of unity of invention

The application lacks unity (Rule 13.1 PCT).

As explained in Re Item V paragraph 1, the subject matter of claim 1 is not new and therefore claim 1 cannot define the common inventive concept linking together the dependent claims.

Among the dependent claims the following main groups can be identified:

- I. Organisation of the Antenna elements into a hierarchic structure
Claims 1-2: Setting out first and second order groups.
- II. Beamforming
Claims 3 - 9: Specification of a two stage beam forming network..
- III. Antenna elements
Claims 10, 11: Antenna elements with two polarisations.
- IV. Receiver
Claim 12: Defining independent receivers.
- V. Electronic surveillance measures
Claims 13-16: A second parallel system using the same set of antennas for electronic surveillance measures.

VI. Systems

Claim 17 - 20: Integration of antennas into systems.

Consequently, the different groups solve different problems and contain entirely separate and different features which by no means can be said to define corresponding special technical features or any common inventive concept.

Claims 21 and 22 do not meet the requirement of Art. 6 PCT since they do not disclose any technical feature.

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of claim 1 is not new in the sense of Article 33(2) PCT.

The document D12 discloses (the references in parentheses applying to this document):

An antenna comprising a plurality of antenna elements (D12, page 21), the antenna being operable with sets of the antenna elements organized into first order groups (D12, page 21, paragraph 3, "subarrays") and with sets of first order groups organized into sets of second order groups (D12, page 21, paragraph 3, related to "sections" used for a "function"; Fig. 1), the antenna further comprising a controller (Fig. 2, "resource allocation manager") operable to reconfigure dynamically the organisation of first order groups into second order groups (D12, page 21, paragraph 2 and 3; Fig. 1).

2. Dependent claims 2-9 do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of novelty and inventive step, see document D12 (page 21; Fig. 1 and especially Fig. 3).
3. Further minor defects in the international application:
 - 3.a. Claim 1 does not meet the requirements of Rule 6.3(b) PCT, whereby the independent claims should be properly cast in the two part form, with those features part of the prior art being placed in the preamble (Rule 6.3(b)(i) PCT)

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and the subject-matter, for which protection is sought, being placed in the characterising portion (Rule 6.3(b)(ii) PCT).

- 3.b. Claim 1-9 do not meet the requirements of Rule 6.2 (b) PCT, whereby technical features mentioned in the claims should be provided with reference signs in parentheses. This applies to both the preamble and the characterising portion.
- 3.c. The present application does not meet the requirements of Rule 9.1 (iv) PCT, since it contains obviously unnecessary statement in the description as on page 16, lines 10-12.

CLAIMS

1. An antenna comprising a plurality of antenna elements, the antenna being operable with sets of the antenna elements organised into first order groups and with sets of first order groups organised into sets of second order groups, the antenna further comprising a controller operable to reconfigure dynamically the organisation of first order groups into second order groups.
2. An antenna according to claim 1, wherein the organisation of antenna elements into first order groups is fixed.
3. An antenna according to any preceding claim, further comprising a first beam forming network operable to receive signals from the antenna elements and/or operable to transmit signals to the antenna elements, wherein the first beam forming network comprises a local network for manipulating signals received by or to be transmitted by an antenna element and a remote network for manipulating the signals received from or to be transmitted to a plurality of the local networks.
4. An antenna according to claim 3, wherein the signals from the antenna elements of a first order group are combined within the local network before transmission to the remote network or a signal from the remote network is separated within the local network for transmission to the antenna elements of a first order group.
5. An antenna according to claim 3 or claim 4, wherein the local network is operable with RF signals.
6. An antenna according to claim 5, wherein the remote network is operable with optical frequency signals.

7. An antenna according to claim 6, wherein the local network is operable to upconvert an RF signal to an optical frequency signal prior to transmission to the remote network.

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8. An antenna according to claim 6 or claim 7, wherein the remote network is operable to digitise a signal received from the local network.

9. An antenna according to any of claims 6 to 8, wherein the remote network is operable to provide true time delay.

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10. An antenna according to any preceding claim, wherein an antenna element is operable with two polarisations.

11. An antenna according to claim 10, wherein the polarisations are mutually orthogonal.

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12. An antenna according to any preceding claim, wherein each second order group is provided with its own receiver.

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13. An antenna according to any preceding claim, further comprising at least one group of antenna elements for use in ESM analysis mode.

14. An antenna according to claim 13, further comprising a second beam-forming network operable to receive signals from the antenna elements of the at least one group of antenna elements for use in ESM analysis mode.

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15. An antenna according to claim 14, wherein the second beam-forming network comprises a local network and a remote network.

5 16. An antenna according to any preceding claim, further comprising ESM elements for transmission of ESM signals.

17. An antenna system comprising a plurality of antennas according to any preceding claim.

10 18. A platform comprising an antenna according to any of claims 1 to 16.

19. A platform according to claim 19, wherein the platform is an airborne vehicle, ship or boat.

15 20. A platform comprising an antenna system according to claim 17.

21. An antenna substantially as described herein with reference to any of Figures 1 to 5.

20 22. An antenna system substantially as described herein with reference to any of Figures 1 to 5.